Space Weather Forecast

Issued on Monday, 20 December 2021 at 00:37 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Chance of G1/Minor storms early day 1 (20th), but soon easing. Chance of Moderate flares.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity is currently Low with only small common class flares observed. There are ten sunspot regions on the Earth-facing disc, although the majority of these are small and simple, and unlikely to produce notable flares. The main ones of interest are currently in the south central disc, with the most magnetically complex one a relatively small bipolar region just the west of centre (right-hand side of the Sun on satellite imagery), and this was the source of the largest of the flares observed. No Earth-directed coronal mass ejections (CMEs) have been observed.

Solar Wind / Geomagnetic Activity: Solar winds were initially at background but become slightly elevated due to the arrival of the fast winds from a coronal hole. This enhancement was accompanied by a dense region of solar wind that also had a notable magnetic field, becoming strong for a time. This included the north-south component, which, whilst varying between northward and southward directions, also became strong around 19/2030 UTC. This lead to Quiet geomagnetic activity at first, becoming Active from 1800, with a period of G1/Minor Geomagnetic Storming 2100-2400.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background with no solar radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to continue mainly Low, with the Chance (25%) of isolated M-class flares, predominately from the more complex sunspot on the disc, but cannot be ruled out from the other sunspot regions on the disc given further development. There are also a number of filaments on the disc (lines of material held above the Suns surface by its magnetic field). These will be monitored for any potential lift.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs. Current slightly elevated solar winds originating from a coronal hole, are expected to persist day 1 (20th), perhaps strengthening further. These remain slightly elevated to elevated days 2 and 3 (21st and 22nd) before easing later in the period. Unsettled to Active geomagnetic activity is expected at first, with a chance of G1/Minor Storms, easing to Quiet with Unsettled periods, and a chance of isolated Active intervals through days 1-3 (20th-22nd). Mainly Quiet day 4 (23rd).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to stay at background with no solar radiation storms expected. Any significant flares could lead to this count rate increasing, although still expected to stay below radiation storm level.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	30	5	5	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	25	25	25	25
Very Active	R3 to R5 X	No	2	2	2	2

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	2	2	2	2
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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